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The γ -transitions in ^{110}Cd fed by the decay of ^{110m}Ag are shown in Fig. 1. It can be seen that there are several cascades which seem to be suitable for measuring the g-factor of the first 2^+ excited state at 656 keV. The best choice was found to be to measure the 1504-656 keV and the 1384/885/-656 keV cascades simultaneously. The intermediate radiation in the latter is unobserved, the error involved is negligible since the lifetime of the second vibrational group is 5-10 times shorter than that of the first vibrational state in the even-even Cd isotopes [1], [5]. Owing to the very short, 6,5 ± 0,6 ps, [2] lifetime, only the internal magnetic field method [3] can be used for the measurement. The internal magnetic field is known to be $-3,48.10^5$ G [4] at the Cd nucleus in Fe.

About 100 μc ^{110m}Ag in 1 mg $AgNO_3$ carrier was electroplated onto an iron cylinder, 1 mm in diameter and 2 mm high, then diffused into the iron lattice at 900 °C for 24 hours. The first run in the experiment was performed with the source thus prepared. For the next run the source was molten in vacuum by induction furnace. The results were the same in either case.

The discriminator channels were set to the 656 keV and the 1384 + 1504 keV photopeaks. The angular correlation coefficient was obtained from the measurement as A_2=-0,29 ± 0,01, the coefficient A_4 was taken to be negligible [6].

The effect of the magnetic field was measured at 135° and at 225° and the values of the ratio

$$\frac{R}{2} = \frac{W(\vartheta, H\uparrow) - W(\vartheta, H\downarrow)}{W(\vartheta, H\uparrow) + W(\vartheta, H\downarrow)},$$

where $W(\vartheta, H\parallel)$ is the angular correlation function in the presence of a magnetic field, were found to be $\frac{R}{2} = (2{,}09 \pm 1{,}00).10^{-3}$ and $\frac{R}{2} = (-1{,}65 \pm 1{,}00).10^{-3}$, respectively. In this measurement the direction of the small external field was alternated every 100 s, and the angles every 400 s. The mean value of $\frac{R}{2} = 1{,}9 \pm 0{,}7\ .10^{-3}$. Calculating with the values of τ and H referred to above, the results is

$$g = 0{,}30 \pm 0{,}12$$

which is in near agreement with the value of $\frac{Z}{A} = 0{,}43$ predicted by the collective model of vibrational states.

References

[1] B.S.Dzelepov, L.K.Peker and V.O.Sergejev, Decay Schemes of Radioactive Nuclei, Academy of Sciences of the USSR Press, Moscow, Leningrad 1963.

[2] P.H.Stelson and F.K.McGowan, Phys. Rev. 110, 489 /1958/

[3] L.Keszthelyi, I.Berkes, I.Dézsi, B.Molnár and L.Pócs, Physics Letters 8, 195 /1964/

[4] D.A.Shirley and G.A.Vestenbarger, Phys . Rev. 138, A170 /1965/

[5] Gy.Bencze and J.Zimányi, Acta Physica Hungarica 20, 209 /1966/

[6] S.Funk and M.L.Wiedenbeck, Phys. Rev. 112, 1247 /1958/

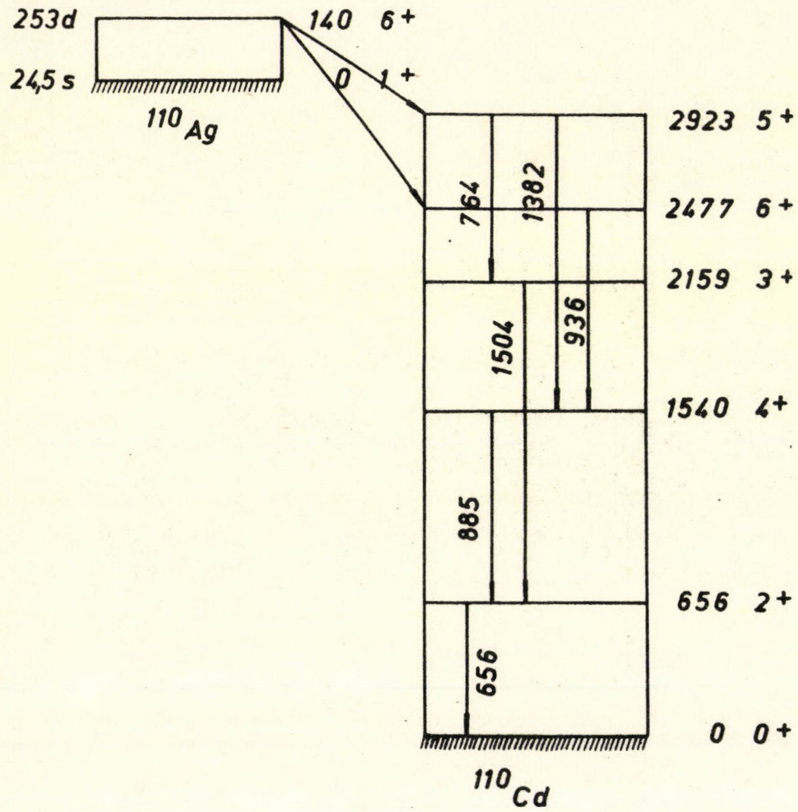

Fig. 1

Decay scheme of ^{110m} Ag.

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